

Remarks/Arguments:

Claims 1-8 are pending in the above-identified application and stand rejected. By the present Amendment, claims 1 and 5 are amended. Accordingly, claims 1-8 are presented for reconsideration.

Rejections of Claims 1-4 under 35 U.S.C. §103

Claims 1-4 are rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese Application Publication No. 10-109163 of Kawamoto in view of U.S. Patent No 6,248,976 to Blankenship. By the present Amendment, claim 1 is amended. Applicants respectfully assert that neither Kawamoto, nor Blankenship, nor their combination discloses or suggests all of the features of claims 1-4.

In particular, Applicants respectfully assert that neither Kawamoto, nor Blankenship, nor their combination discloses or suggests all of the features of claim 1, for example:

. . . the machine further comprises an arc resistance calculator . . . the arc resistance calculator calculates the arc resistance signal **by dividing the welding voltage detection signal by the welding current detection signal**. (Emphasis added.)

Support for these features may be found throughout the above-identified application, for example, on page 8, lines 9-12. No new matter has been added.

1. Summary of Blankenship

Illustrated in Fig. 2 of the Blankenship is a welder 30 that produces a welding voltage V_a across an electrode E and a workpiece WP. (See Blankenship, Col. 6, lines 55-57.) To provide the voltage V_a and a welding current I_a , there is provided a power supply 40 having output leads 42 and 44 connected across the electrode E and the workpiece WP. (See Blankenship, Col. 6, lines 58-61.) The power supply generates the welding current I_a , which has a wave shape determined by a signal provided by a pulse width modulator 60. (See Blankenship, Col. 6, lines 63-66.) The pulse width modulator 60 is controlled by an error signal that is dependent on a "control signal." (See Blankenship, Col. 6, line 66 through Col. 7, line 2 and Col. 10, lines 48-52.) Blankenship's invention "is the development of a novel control signal which is **the**

derivative of the welding voltage V_a with respect to the current I_a ." (See Blankenship, Col. 7, lines 13-15, emphasis added.)

Included within the welder 30 is a signal generator 120 that causes the pulse width modulator 60 to produce a current dither pattern 100. (See Blankenship, Col. 7, lines 19-20 and 59-65.) By providing the current dither pattern 100 to the power supply 40, the welder 30 is able to calculate the derivative of the welding voltage V_a with respect to the welding current I_a (dV/dI), i.e., the control signal. (See Blankenship, Col. 7, lines 13-15.)

2. *Blankenship does not disclose or suggest all of the above-quoted features of claim 1*

The Office Action admits that Kawamoto does not disclose or suggest the features of claim 1 relating to "an arc resistance calculator." (See Office Action, page 3, lines 10-12.) The Office Action asserts that Col. 2, lines 14-28 of Blankenship teaches such features. (See Office Action, page 3, lines 13-16.) Applicants respectfully contend that Blankenship does not disclose or suggest all of the features of claim 1 relating to "an arc resistance calculator."

Claim 1 recites that "the arc resistance calculator calculates the arc resistance signal by dividing the welding voltage detection signal by the welding current detection signal." As described above, Blankenship's calculation of dV/dI involves dividing a **change** in voltage by a **change** in current. The control signal dV/dI is not calculated "by dividing the welding voltage detection signal by the welding current detection signal," as recited in claim 1. In fact, Blankenship clearly states that the "invention relates to the concept of sensing the **derivative of** voltage with respect to current **to give a resistance function that ignores current.**" (See Blankenship, Col. 2, lines 34-36, emphasis added.) Thus, the calculation in Blankenship is different from that recited in claim 1, and Blankenship, in fact, teaches away from the calculation recited in claim 1. Accordingly, Applicants respectfully assert that Blankenship does not disclose or suggest all of the features of claim 1 relating to "an arc resistance calculator." Withdrawal of the rejection and favorable reconsideration and allowance of claim 1 are respectfully requested.

Claims 2-4 depend from claim 1 and, therefore, include all of the features recited therein. Accordingly, for at least the same reasons as those discussed above with respect to claim 1, Applicants respectfully assert that neither Kawamoto, nor Blankenship, nor their combination discloses or suggests all of the features of claims 2-4. Withdrawal of the rejections and favorable reconsideration and allowance of claims 2-4 are respectfully requested.

Rejection of Claims 5-8 under 35 U.S.C. §103(a)

Claims 5-8 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kawamoto in view of Blankenship and further in view of U.S. Patent No. 1,687,492 to Churchward. By the present Amendment, Applicants amend claim 5. Applicants respectfully assert that neither Kawamoto, nor Blankenship, nor Churchward, nor their combination discloses or suggests all of the features of claims 5-8.

In particular, neither Kawamoto, nor Blankenship, nor Churchward, nor their combination discloses all of the features of claim 5, for example:

. . . an arc resistance calculator for calculating and outputting an arc resistance signal after accepting the welding voltage detection signal and the welding current detection signal, **the arc resistance calculator calculating the arc resistance signal by dividing the welding voltage detection signal by the welding current detection signal;**

a constant-current control period setting unit for outputting a constant-current control period signal which indicates a constant-current control period after accepting the arc resistance signal when the arc resistance signal continues exhibiting a value that is greater than a certain specific value **for a predetermined period of time** . . . (Emphasis Added)

Support for these features may be found throughout the above-identified application, for example, at page 8, lines 9-12 and page 17, lines 21-26. No new matter has been added.

1. *Blankenship does not disclose or suggest all of claim 5's features relating to the "the arc resistance calculator calculating the arc resistance signal by dividing the welding voltage detection signal by the welding current detection signal"*

The Office Action admits that Kawamoto does not disclose or suggest the features of claim 5 relating to "an arc resistance calculator." (See Office Action, page 6, lines 3-7.) The Office Action asserts that Col. 2, lines 14-28 of Blankenship teaches such features. (See Office Action, page 6, lines 7-10.) For at least the same reasons as those discussed above with respect to claim 1, Applicants respectfully contend that Blankenship does not disclose or suggest all of the above-quoted features of claim 5 relating to the "the arc resistance calculator calculating the arc resistance signal by dividing the welding voltage detection signal by the welding current detection signal." Withdrawal of the rejection and favorable reconsideration and allowance of claim 5 are respectfully requested.

2. *Churchward does not disclose or suggest all of claim 5's features relating to "when the arc resistance signal continues exhibiting a value that is greater than a certain specific value"*

The Office Action admits that Kawamoto does not disclose the feature of "when the arc resistance signal continues exhibiting a value that is greater than a certain specific value," as recited in claim 5, but asserts that Churchward discloses this feature. (See Office Action, page 6, lines 10-12.) Applicants respectfully assert that Churchward does not disclose or suggest the features of "when the arc resistance signal continues exhibiting a value that is greater than a certain specific value for a predetermined period of time," as recited in claim 5.

Churchward describes an electric welding apparatus having an electrode 14 that is applied to a work 17. (See Churchward, page 1, lines 67-69.) When the electrode 14 is applied to the work 17, the resistance offered at the work 17 is reduced to a minimum and thus the current in the welding circuit rises to a high value. (See Churchward, page 1, lines 67-72.) When an arc is formed, the work provides a resistance which varies according to the length of the arc. (See Churchward, page 1, lines 76-79.) As the arc length is lengthened, the arc resistance increases. (See Churchward, page 1, lines 79-81.) In order to overcome the increased resistance, the voltage applied across the work is increased. (See Churchward, page 1, lines 81-85.)

Churchward does not disclose features relating to an "arc resistance signal," for example that it "continues exhibiting a value that is greater than a certain specific value for a predetermined period of time," as recited in claim 5. Churchward does not describe that an "arc resistance signal" has a "certain specific value for a predetermined period of time." Accordingly, Applicants respectfully assert that Churchward does not disclose or suggest all of the above-quoted features of claim 5. Withdrawal of the rejection and favorable reconsideration and allowance of claim 5 are respectfully requested.

Claims 6-8 depend from claim 5 and, therefore, include all of the features recited therein. Accordingly, for at least the same reasons as those discussed above with respect to claim 5, Applicants respectfully assert that neither Kawamoto, nor Blankenship, nor Churchward, nor their combination discloses or suggests all of the features of claims 6-8. Withdrawal of the rejections and favorable reconsideration and allowance of claims 6-8 are respectfully requested.


Application No.: 10/594,909
Amendment Dated July 13, 2009
Reply to Office Action of April 15, 2009

MAT-8911US

Conclusion

In view of the foregoing remarks and amendments, Applicants respectfully assert that the above-identified application is in condition for allowance, which action is respectfully requested.

Respectfully submitted,



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Dated: July 13, 2009

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